II. AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions, and listings, of claims of the application.

1 – 10. (Cancelled)

11. (Currently Amended) A method of evaluating image quality of an electron beam lithography tool, the method comprising the steps of:

generating a test array of test pattern cell exposures at ~~at least thirteen~~ a plurality of sub-field test positions in an exposure field, wherein each test pattern cell exposure within a given test array occurs under a different set of lithography tool test corrections; ~~and~~

evaluating image quality based on the test arrays; and

applying a tool correction for a selected sub-field position within the exposure field based on recorded test corrections for the sub-field test positions, including:

implementing a two-dimensional, third-order polynomial equation for each recorded test correction;

calculating a set of correction coefficients for each two-dimensional, third-order polynomial equation; and

applying the set of correction coefficients to determine the tool correction for the selected sub-field position.

12. (Original) The method of claim 11, wherein each test pattern cell exposure has a corresponding exposure in each test array that occurs under the same set of lithography tool test corrections.

13. (Original) The method of claim 11, wherein the generating step includes:

repeatedly exposing the test pattern cell at each sub-field test position on a resist coated substrate,

shifting the resist coated substrate a predetermined distance between each exposure to generate the test array at each sub-field test position, and

developing the resist coated substrate to generate the test array at each sub-field test position.

14. (Currently Amended) The method of claim [[11]] 13, wherein the step of shifting includes shifting in both a first direction and a second direction within a single plane.

15. (Original) The method of claim 11, wherein the evaluating step includes:

determining which exposure within each test array provides a highest image quality and recording a test correction for that exposure for each sub-field test position.

16-17. (Cancelled)

18. (Original) The method of claim 11, wherein the evaluating step is conducted for at least one of a focus correction, an in-axis astigmatism correction, and an off-axis astigmatism correction.

19. (Original) The method of claim 11, wherein the test pattern cell includes:

a set of at least three elongated spaces, each elongated space having a different width than other elongated spaces in the set; and

at least one box-in-box pattern.

20-21. (Cancelled)

22. (Currently Amended) A computer-readable storage medium having stored therein instructions for performing a method, the method comprising the steps of:

determining a lithography tool correction for a selected sub-field position within an exposure field of the lithography tool based on recorded test corrections for ~~at least thirteen~~ a plurality of sub-field test positions including:

implementing a two-dimensional, third-order polynomial equation for each recorded test correction;

calculating a set of correction coefficients for each two-dimensional, third-order polynomial equation; and

applying the set of correction coefficients to determine the lithography tool correction for the selected sub-field position.

23. (Currently Amended) A system for optimizing lithography tool image quality, the system comprising:

means for determining a tool correction for a selected sub-field position within an exposure field of a lithography tool based on recorded test corrections for ~~at least thirteen~~ a plurality of sub-field test positions, the determining means including:

means for implementing a two-dimensional, third-order polynomial equation for each recorded test correction;

means for calculating a set of correction coefficients for each two-dimensional, third-order polynomial equation; and

means for applying the set of correction coefficients to determine the tool correction for the selected sub-field position.

24. (New) The method of claim 11, wherein the plurality of sub-field test positions includes at-least thirteen sub-field test positions.

25. (New) The storage medium of claim 22, wherein the plurality of sub-field test positions includes at least thirteen sub-field test positions.

26. (New) The system of claim 23, wherein the plurality of sub-field test positions includes at least thirteen sub-field test positions.

27. (New) The system of claim 23, wherein the determining means further includes:

means for determining which exposure within each test array provides a highest image quality and recording a test correction for that exposure for each sub-field test position.

28. (New) The system of claim 23, wherein the test pattern cell includes:

a set of at least three elongated spaces, each elongated space having a different width than other elongated spaces in the set; and

at least one box-in-box pattern.